IN THE CLAIMS:

Please amend the claim as follows:

1. (Currently Amended) A semiconductor optical device comprising of:

a first conductive semiconductor substrate;

a semiconductor optical amplifier ~~formed~~ disposed on the semiconductor substrate ~~so as to have~~ having a horizontal-direction lasing structure for generating a laser oscillation in a horizontal direction and amplifying a light input to the semiconductor optical amplifier in a length direction, wherein the length direction is in a non-parallel relationship with the horizontal direction; and

a first and a second photo detector ~~formed~~ disposed respectively at positions of the semiconductor substrate spaced horizontally from an input side and an output side of the semiconductor optical amplifier so as to measure intensities of an input signal and an output signal of the semiconductor optical amplifier.

2. (Original) The semiconductor optical device as claimed in claim 1, wherein the semiconductor optical amplifier includes a ridge waveguide-type semiconductor optical amplifier.

3. (Original) The semiconductor optical device of claim 2, further including a current blocking layer that comprises two p-InP layers and an n-InP layer.

4. (Currently Amended) The semiconductor optical device as claimed in claim 2, wherein the semiconductor optical amplifier comprises:

a Bragg lattice ~~formed~~ disposed selectively on a portion of the semiconductor substrate except for a predetermined gain layer area;

a first conductive lower clad layer ~~formed~~ disposed on and co-extensively with an upper surface of the semiconductor substrate so as to surround the Bragg lattice;

an optical waveguide layer ~~formed~~ disposed on the lower clad layer;

a first conductive upper clad layer ~~formed~~ disposed on the optical waveguide layer;

a gain layer ~~formed~~ disposed on a portion of the first conductive upper clad layer that corresponds to the predetermined gain layer area in order to amplify an optical signal;

a first electrode for supplying current to the gain layer; and

a current blocking layer for preventing current from flowing to any area except the gain layer.

5. (Currently Amended) The semiconductor optical device as claimed in claim 4, wherein the first and the second photo detectors are respectively ~~formed~~disposed on portions of the first conductive upper clad layer horizontally spaced from an input side and an output side of the semiconductor optical amplifier.

6. (Currently Amended) The semiconductor optical device as claimed in claim 5, wherein each of the first and the second photo detectors comprises:

an active layer including a material that is the same as that of the gain layer;

a second conductive clad layer ~~formed~~disposed on the active layer; and

a second electrode ~~formed~~disposed on the second conductive clad layer.

7. (Currently Amended) The semiconductor optical device as claimed in claim 4, wherein each of the first and the second photo detectors comprises:

an active layer including a material that is the same as that of the gain layer;

a second conductive clad layer ~~formed~~disposed on the active layer; and

a second electrode ~~formed~~disposed on the second conductive clad layer.

8. (Currently Amended) The semiconductor optical device as claimed in claim 7, wherein the optical waveguide layer is ~~formed~~disposed above or below the Bragg lattice.

9. (Currently Amended) The semiconductor optical device as claimed in claim 4, further comprising a phase conversion area ~~formed~~disposed between lattices of the Bragg lattice.

10. (Original) The semiconductor optical device as claimed in claim 9, further comprising a phase conversion electrode for supplying current to the phase conversion area.

11. (Original) The semiconductor optical device as claimed in claim 10, wherein the phase conversion electrode is disposed on a portion of the current blocking layer that corresponds to the phase conversion area.

12. (Withdrawn) The semiconductor optical device as claimed in claim 1, wherein the semiconductor optical amplifier includes a buried hetero-structure semiconductor optical amplifier.

13. (Withdrawn) The semiconductor optical device of claim 12, further including a current blocking layer.

14. (Withdrawn) A method of fabricating a semiconductor optical amplifier having a photo detector, the method comprising the steps of:

(a) forming a Bragg lattice on a portion of a first conductive semiconductor substrate except for a predetermined gain layer area and a predetermined photo detector area;

(b) forming a first conductive lower clad layer, an optical waveguide layer, a first conductive upper clad layer, a gain material layer, and a second conductive clad layer on the first conductive semiconductor substrate on which the Bragg lattice is formed;

(c) forming mask patterns on portions of the second conductive clad layer which correspond to the predetermined gain layer area and on areas spaced horizontally by a predetermined distance respectively from a front end and a rear end of the predetermined gain layer area;

(d) selectively etching the second conductive clad layer and the gain material layer

through an etching process using the mask patterns as an etching mask, and then removing the mask patterns;

(e) forming a current blocking layer for preventing current from flowing to any area except the gain layer; and

(f) forming an electrode for supplying current to the gain layer and the photo detector area.

15. (Withdrawn) The method as claimed in claim 14, wherein, in step (a), the Bragg lattice is formed on a portion of the semiconductor substrate except for the predetermined gain layer area, the predetermined photo detector area, and a predetermined phase conversion area.

16. (Withdrawn) The method as claimed in claim 15, wherein, step (f) further includes a step of forming electrodes for supplying current to the gain layer area, the photo detector area, and the phase conversion area.

17. (Withdrawn) The method as claimed in claim 14, further comprising the step of integrating the semiconductor optical amplifier onto a single crystal semiconductor substrate without performing a separate photo detector growing process.

18. (Withdrawn) A method of fabricating a semiconductor optical amplifier having a photo detector, the method comprising the steps of:

(a) forming a gain material layer and a second conductive lower clad layer on a first conductive semiconductor substrate;

(b) forming mask patterns on portions of the second conductive lower clad layer corresponding to a predetermined gain layer area and a predetermined photo detector area, and selectively removing the second conductive lower clad layer, the gain material layer, and the semiconductor substrate through an etching process using the mask patterns as an etching mask, thereby forming a gain layer of a mesa structure, an active layer of a photo detector, and an etching groove;

(c) forming a current blocking layer at the etching groove;

(d) forming an optical waveguide layer including a material having a refractive index higher than that of the semiconductor substrate on the current blocking layer;

(e) forming a Bragg lattice on the optical waveguide layer;

(f) forming a second conductive upper clad layer on an entire upper surface of a resultant structure on which the Bragg lattice is formed; and

(g) forming electrodes for supplying current to the gain layer and the active layer of the photo detector, respectively.

19. (Withdrawn) The method as claimed in claim 18, wherein, in step (e), a predetermined portion of the Bragg lattice layer has no Bragg lattice so as to form a phase conversion area thereto.

20. (Withdrawn) The method as claimed in claim 19, wherein, in step (g), a first, a second, and a third electrode for supplying current to the gain layer, the active layer of the photo detector, and the phase conversion area are formed.

21. (New) The semiconductor optical device as claimed in claim 1, wherein the lasing horizontal-direction is perpendicular to the signal amplification direction.

22. (New) The semiconductor optical device as claimed in claim 4, wherein the semiconductor optical amplifier further comprises a passive optical waveguide layer.

23. (New) The semiconductor optical device as claimed in claim 22, wherein the passive optical waveguide layer has a refractive index grater than that of the semiconductor substrate.

24. (New) The semiconductor optical device as claimed in claim 22, wherein the passive optical waveguide layer is configured to provide an optical confinement between the Bragg lattice and the gain layer.

25. (New) The semiconductor optical device as claimed in claim 10, wherein the phase conversion electrode is configured to control the lasing wavelength.

26. (New) The semiconductor optical device as claimed in claim 10, wherein the phase conversion electrode is configured to provide a changing current to the phase conversion area.

27. (New) The semiconductor optical device as claimed in claim 1, wherein the semiconductor optical amplifier configured to amplify an input signal without a wavelength filter for removing an oscillation wavelength generated by the semiconductor optical amplifier.

28. (New) The semiconductor optical device as claimed in claim 4, wherein the first and second photo detectors comprise same materials as those of the gain layer.

29. (New) The semiconductor optical device as claimed in claim1, wherein the first and second photo detectors are configured to measure the intensities of the input signal and the output signals of the semiconductor optical amplifier without an optical divider.